Lat 40.71148 Lon -121.16203

Forest Health Protection
Pacific Southwest Region

3420 Evaluation
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Re-location of the Site of the First Report of Black Stain Root Disease

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John Kliejunas,
Forest Pathologist, Forest Health Protection

and

Richard S. Smith,
Research Forest Pathologist, retired

Background

In 1939, J. W. Bongberg, a Junior Entomologist with the USDA Bureau of Entomology and Plant Quarantine, reported finding, during a periodic insect loss cruise, a "peculiar dark brown staining fungus infecting the sapwood of the lower bole of a single thrifty, immature ponderosa pine tree on the Blacks Mountain Experimental Forest during the season of 1938" (Bongberg 1939). Bongberg's field examination of this dead tree revealed an absence of the usual aggressive bark beetles normally found in recently killed trees on Blacks Mountain, and the presence of a brown streaked sapwood stain. In the bole, the stain was found only in the sapwood, extending to approximately 10 feet above the ground. The roots, growing in well-drained lava soil among many rocks, were stained and dead, but were sound.

He sent samples of the stain to Dr. W. W. Wagener, Senior Forest Pathologist with the Bureau, for identification of the causal organism. In reply, Dr. Wagener stated "examination under the microscope shows the presence of very large brownish hyphae in the tracheids or apparently in some cases in intercellular spaces."

USDA Forest Service, Pacific Southwest Region
State and Private Forestry, Forest Health Protection
1323 Club Drive, Vallejo, California 94592

The tree was later felled and the entire bole and excavated roots examined. The only sign of insects associated with the bole was incipient attacks of *Melanophila gentilis* Lec., that "entered the bole as a result of the weakening effects of the fungus." Bongberg found adults of *Hylurgops subcostulatus* Mann., feeding under the bark of the roots, and sent samples of the stained roots to Dr. Wagener. In his reply, Dr. Wagener stated that "the roots are literally filled with large brown hyphae…the resin infiltration is a good indication that a pathogen affecting the roots or root collar was involved in the death of the tree."

The report by Bongberg is the first recorded description of what was later called black stain root disease. Localized foci of the disease were subsequently found in the next few years in ponderosa and Jeffrey pines in several other compartments of the Experimental Forest and in the Willow Creek drainage, Big Valley Ranger District, Modoc National Forest (Wagener and Mielke 1961). The causal organism (from pinyon pine) was described as a new species, *Verticicladiella wageneri*, in 1962 (Kendrick 1962), and later transferred to the genus *Leptographium* (Wingfield 1985).

In the years following this 1939 report, researchers were aware of the site (as evidenced by Wagener's description in his 1961 publication), but its exact location had not been recorded. In 1970, a recently hired research forest pathologist with the Pacific Southwest Research Station, Richard S. Smith, Jr., was shown the site by W. W. Wagener as part of his introduction to the forest disease problems in California. Dr. Smith subsequently established a spread plot at the site, tagged individual trees in and around the center, recorded above ground symptoms, and measured and mapped advance of the crown symptoms yearly. In 1977 Dr. Smith was re-assigned to the Institute of Pacific Islands Forestry in Honolulu and left his field notes and maps at the PSW Station in Berkeley. The notes were apparently lost during the moves the Station made in subsequent years.

In 1978, Dr. Smith returned to California as the Forest Pest Management Supervisory Plant Pathologist in the Pacific Southwest Region. In 1983, while traveling the roads of Blacks Mountain Experimental Forest as part of a mortality survey, Dr. Smith showed the Bongberg site to Bruce Roettgering, Supervisory Entomologist with the Region. In 1985 Dr. Smith assumed the position of staff Research Forest Pathologist with Forest Insect and Disease Research in the Washington Office. He retired in 1994.

The site of the original Bongberg report was forgotten until about 1996, when Roettgering was working on black stain root disease on the Devils Garden Ranger District, Modoc National Forest. Many of the site conditions on the Devils Garden where black stain was prevalent reminded Roettgering of the site he saw in 1983 with Smith. Roettgering suggested that the site of the original report of black stain root disease should be re-located and monumented because of its historical significance and because of the knowledge that could be obtained from examination of current conditions at the site.

2003 Re-location Trip

On October 20-21, 2003, Richard S. Smith and Bruce Roettgering traveled to Blacks Mountain Experimental Forest to re-locate the Bongberg site. After traveling numerous roads in the Experimental Forest, the site was found (Fig. 1). The stake at the point where a plan table was used in the early 1970s to map spread was still in place, several metal signs marked the site, and numerous metal tags with numbers placed by Richard were still visible (Figs. 2, 3).

The site was re-visited October 28, 2003. Metal signs were placed on trees at the boundaries of the active center and gps readings were taken (UTM NAD 83 coordinates: N 4508289.54 meters, E 655171.22 meters; and Lat/Long: 40º 42' 39.791" N, 121º 9' 43.116" W). The site is located on the east side of road 33N73, 0.1 mile south from road 33N81; the legal description is the NE ¼, SW ¼, Sec. 23, T 33 N, R 7 E.

Conclusions

The site, surprisingly, remains an active black stain root disease center 65 years after the original description by Bongberg, with ponderosa pines dead and dying at the margin and the diagnostic dark stain present in sapwood of fading pines (Fig. 4, 5). Unfortunately the data and spread map from the early 70s has been lost. The re-located Bongberg site should be documented, marked, and future spread of the root disease followed.

Bongberg indicated in his 1939 report that the black stain was rare on the Experimental Forest, and he made no mention of finding additional centers during his 1938 mortality survey. While traveling the roads of the Experimental Forest in 2003, we observed numerous pockets of active black stain root disease, suggesting that the incidence of black stain root disease has increased over the years. It would be interesting to determine the current incidence of black stain root disease centers on Blacks Mountain in relation to past management activities. These areas of root disease could also be marked and spread followed before and after scheduled management activities to determine the affect of the disease on management objectives of the Experimental Forest.

Literature Cited

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Wagener, Willis W.; Mielke, James L. 1961. A staining-fungus root disease of ponderosa, Jeffrey, and pinyon pines. Plant Disease Reporter. 45(11): 831-835.

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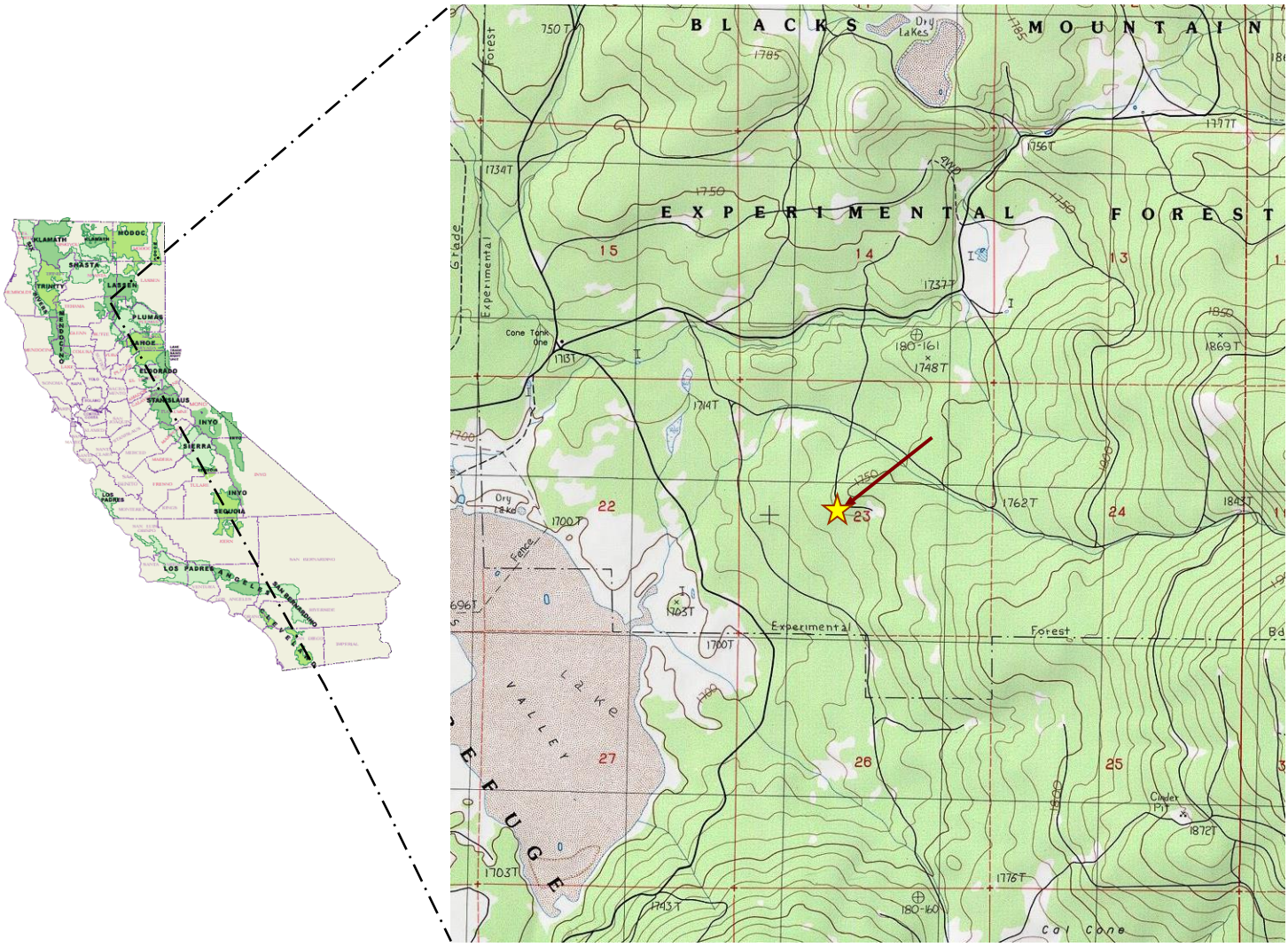

Figure 1. Location of the original 1938 Bongberg report of black stain root disease, Blacks Mountain Experimental Forest, Lassen National Forest.

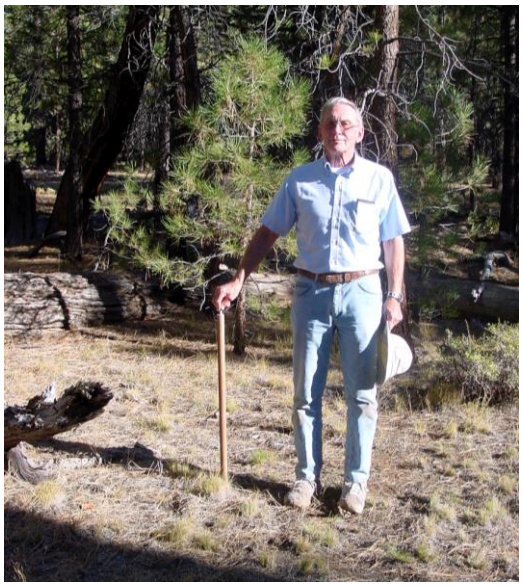

Fig. 2. Richard S. Smith at Bongberg site.

Fig. 3. Tree tagged in about 1970.

Fig. 4. Black stain infected pines.

Fig. 5. Brown-streaked sapwood.